AN EVER CHANGING POLLUTION PREVENTION PICTURE (#152)

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INTRODUCTION

Fort Lewis Military Reservation is an 86,176 acre Army installation located 35 miles south of Seattle and 7 miles northeast of Olympia. Various military and non-military organizations at Fort Lewis perform services and functions, which require the use of hazardous substances and generate hazardous waste. These activities are vital to the field readiness of military troops and support the day-to-day functions of Fort Lewis as a community. Services include the maintenance of over 4,500 Fort Lewis buildings and infrastructure such as roads and utilities, operation and maintenance of over 3,000 vehicles and nearly 1,500 pieces of equipment including aircraft, weapons systems, power generators, and communications equipment. A major hospital, several medical and dental clinics, printing and graphics facilities, materials storage warehouses and crafts shops also operate on Fort Lewis.

Fort Lewis, the largest employer in Pierce County, has a combined military, civilian and retiree payroll of almost $1 billion. Fort Lewis' force structure includes I Corps Headquarters, which commands all Forces Command units at Fort Lewis. I Corps Headquarters conducts planning and also acts as a liaison with other active and reserve component units in the continental United States and active duty units located around the Pacific Rim and in Hawaii. Fort Lewis directly supports the Yakima Training Center and six Base Realignment and Closure installations in Washington and California. The installation also serves occasional users from other U.S. armed services and units from allied nations.

PROGRAM OVERVIEW

The Fort Lewis Pollution Prevention (P^2) Program is designed to reduce the volume of hazardous materials used and hazardous waste produced on the installation, as well as reduce energy consumption, air emissions, and solid wastes. In FY 96 and 97, the program saved more than $2 million by implementing innovative alternatives to standard processes.

The P^2 Program is an on-going, comprehensive examination of operations on the installation. The primary goal of the P^2 Program is to minimize types and volumes of hazardous materials used and hazardous waste generated in these waste streams, by identifying low cost, commercial-off-the-shelf (COTS) options that make sense, save money, and are in accordance with the law.

The Fort Lewis Pollution Prevention Program operates under these assumptions:

1) Waste is an indicator of inefficiency, which is undesirable;
2) There are numerous waste issues, including air emissions, indoor air quality, non-hazardous waste, energy, hazardous waste, injuries, loss of capacity (land, water, air, ecosystems), and resource waste (money spent on the wrong thing);
3) We are capable of identifying and measuring waste; and
4) We are capable of taking action to reduce waste.

By following these guidelines, the P^2 program reduces operating costs, increases training readiness, protects public health and the environment, and reduces the risk of civil and criminal liability.

Pollution Prevention Plan

The Fort Lewis Pollution Prevention Plan provides a specific plan and implementation schedule for the reduction of hazardous substance use and hazardous waste generation through selected pollution prevention opportunities. A formalized five-year pollution prevention plan was completed in September of 1992, with 1991 as the baseline year.

A formal five-year update was submitted to Washington State Department of Ecology in September 1997. Fort Lewis worked with regulators to ensure that the new plan meets requirements of the state, Department of Defense, and Executive Order 12856. The pollution prevention plan update will have baseline years of 1992, 1994, and 1996 and will be kept current through submission of annual progress reports due September of every year.

Inter-Related Facility Status

To reduce reporting burdens on Fort Lewis and its subinstallations, Fort Lewis applied for and was granted inter-related facility status in May of 1996. This status allows Fort Lewis and its subinstallations to prepare only one plan, prepare only one annual report, and pay only one hazardous waste generator's fee. Thus, inter-related facility status saves Fort Lewis both time and money.

TECHNIQUES AND INNOVATIONS

Pollution prevention projects are identified and evaluated on a yearly basis by utilizing the following steps. Data is collected from the hazardous waste, EPCRA, air and solid waste programs. In each media, the data is prioritized from largest to smallest volumes with most toxic chemicals at the top regardless of volume. The total volume is calculated and 95% of that is targeted for pollution prevention. In many cases, the top HW streams and the top HM used are related. By selecting initiatives that target specific chemicals, it is possible to realize reductions in all media. Fort Lewis follows the EPA waste management hierarchy when evaluating pollution prevention initiatives. Source reduction projects are our first choice, followed by projects that encourage recycling or reuse. In some cases, treatment on site is appropriate. When technology is not available, wastes are disposed through DRMO and other TSDFs.

Reducing the number and types of hazardous materials used and reducing the volume of waste generated provides money that Fort Lewis can use for other facility requirements. Many pollution prevention projects save money by avoiding other costs such as fines and penalties, utilities cost, and labor cost. Pollution prevention projects can be categorized into the following types of projects: Low cost, commercial off the shelf (COTS) technology (best management practices); equipment changes; service changes; process changes; and policy changes. Currently, Fort Lewis is working to validate the implemented projects to show benefit and cost savings realized. Table 1 summarizes a few of our validated implemented projects, benefits and quantifiable cost savings.

GOALS AND PROGRESS

Overall P^2 performance goals for Fort Lewis were established. The goals are listed below:

Hazardous Substance Use Reduction Goals	Hazardous Waste Reduction Goals	Recycle/Reuse Goals	On-Site Waste Treatment Goals
50%	20%	5% of total waste volume	5% of total waste volume

Many factors impact progress toward performance goals. Changing regulations affect what is considered hazardous. Changes in troop strength and vehicle types affect volumes of hazardous materials used and hazardous waste generated. Notable changes for Fort Lewis include the shift from a light

infantry division with no armor in 1991, to a heavy mechanized/armored brigade + in 1995. This included adding approximately 500 tracked vehicles, with up to 500 gallons of fuel each, and associated maintenance programs to the management requirements of the pollution prevention program. The objectives and direction of the pollution prevention program must be able to respond to and answer these challenges as they occur.

Hazardous Substance Use Reduction: In 1994, Fort Lewis began compliance with Executive Order 12856. This executive order requires federal facility to comply with the requirements of the Emergency Planning and Community Right To Know Act and Federal Pollution Prevention Act of 1990. Compliance with Executive Order 12856 has provided better control over the hazardous substances on Fort Lewis. The post prepares weekly hazardous substance inventories submits quarterly reports on activities that use hazardous substances and generate hazardous waste. These inventories are managed using a Microsoft Access database which tracks storage locations and is used to prepare Tier II and Form R reports. In addition, the database can be linked to GIS to prepare maps identifying storage and use locations of Extremely Hazardous Substances, Tier II chemicals, and TRI chemicals.

The EPCRA database was used to summarize the quantities used of TRI Chemicals, 33-50 chemicals, Montreal Protocol Chemicals and restricted use chemicals from 1994-1997. Reduction goals of 50% were met in all but TRI chemical usage.

	50% Goal	1994	1995	1996	1997
TRI Chemical Usage (pounds)	279,560	559,119	960,396	341,315	308,541
33-50 Chemical Usage (pounds)	91,311	182,622	404,979	78,035	87959
Restricted Chemical Usage (pounds)	81,842	163,684	97,246	45,365	31,550
Montreal Protocol Chemical Usage (pounds)	59,698	119,397	50,828	9,376	9,987

Hazardous Waste Reduction: In 1996, 22,484 pounds of EHW and 1,143,752 pounds of DW were generated. 40% of the DW waste generated in 1996 was from a contract to clean out all oil-water separators on the installation and from incinerator ash that did not pass the TCLP. The incinerator came on line in 1996 for test burns. Operators are still determining the optimum operating conditions. 689,235 pounds of HW was from ongoing processes. 96.7% (666,751 pounds) was DW and 3.3% (22,484 pounds) was EHW. The EHW waste generated in 1995 is 79% less than EHW generated in 1991. DW increased by 85%. However, there were two regulatory changes during the five years covered by this plan that regulate more waste as hazardous.

In 1991, Fort Lewis generated 153,885 pounds of EHW and 297,675 pounds of DW. EHW has decreased by 85% from the 1991 baseline year. Since 1995, the EHW decreased by 30.5% or 9883 pounds. DW increased by 123% from the 1991 baseline year. Since 1995, DW increased by 21%. This data has not been normalized.

Hazardous Waste to be Recycled: Five waste streams are currently being recycled at Fort Lewis. In 1991, none of these waste streams were being recycled. In 1994, an off-site recycling program was implemented for Antifreeze. In 1996, 99% of all antifreeze on Fort Lewis was recycled through this program. Safety Kleen also began a recycling program for solvents managed from Fort Lewis. The recycling credits for Safety Kleen has increased from 90% in 1994 to 95% in 1996. Two additional waste streams, medical solvents (ethanol and xylene) are now being recycled on-site. This program was implemented in late 1996. A total of 622 pounds of this solvent was recycled in the last quarter of 1996. While the volumes are relatively low, substantial cost savings is being realized. Foramlin, a tissue preservative used at the hospital, is being filtered and reused, thus avoiding an additional 1091 pounds being managed as HW.

Antifreeze is currently being managed as a non-hazardous waste. The total volume of waste generated in 1996 (minus the 40% incinerator and oil-water separator sludge) was 1,658,772 pounds. Waste currently being recycled is 149, 690 pounds. This is 9% of the total waste, which exceeds the established goal of 5%.

Hazardous Waste to be Treated: In 1991, none of the hazardous waste was being treated on site. In 1995, formaldehyde and formalin solution was being treated manually prior to discharge to the sanitary sewer system. In 1996, equipment was purchased to treat the formaldehyde solution automatically. 87% of this waste stream was treated in 1996.

Equipment to remove silver from photographic fixer was purchased and implemented at the Madigan Army Medical Center. 41,292 pounds of fixer was treated to remove silver, neutralized, and discharged to the federally owned treatment plant. This equipment was implemented in late 1996. 53% of the fixers managed at Fort Lewis underwent the silver recovery process.

Formaldehyde and photographic fixers are managed as HW. A total of 47,077 pounds was treated on site. This is 6.8% of the total HW and 3% of the total waste managed at Fort Lewis. The established goals for treating HW were 5%.

CONCLUSIONS

The pollution prevention program is designed to reduce volumes of hazardous material used and hazardous waste produced on the installation. Reductions are achieved by establishing goals, evaluating data annually, identifying and implementing projects that reduce usage and waste generation, and measuring progress towards the goals. Many factors affect reductions and impact progress towards performance goals. The objective and direction of the program must be able to respond to and address those factors as those occur.

Table 1: Validated Pollution Prevention Projects, Fort Lewis, WA.

	P2 Project	Year	Type of Project	Capitol Investment	Annual Cost Savings	Benefits
1	Silver Recovery Project-MAMC	1996	On-Site Recycling	$19,762	$15,000	Waste Reduction: 80,000 pounds 50 pounds of Silver Reclaimed annually
2	Formaldehyde Filtration & Treatment-MAMC	1996	On-Site Treatment	$6,041	$12,193	HM (TRI) Reduction: 3140 pounds Treatment On-Site: 3140 pounds
3	Medical Solvent Recycling	1997	On-Site Recycling & On-Site Reuse	$11,946	$12,269	Waste Reduction: 2408 pounds HM Use Reduction: 3140 pounds
4	Weapons Cleaning Project	1996	Source Reduction: HM Substitution & Improved Processes and Procedures	$125,612	$2,500,000	HM Use Reduction: 28,000 pounds 85% reduction in Troop Labor Standardization of Process and Materials
5	Parts Washers with Filters in Vehicle Maintenance Applications	1996	Source Reduction: HM Substitution & Improved Processes and Procedures	$78,660	$10,165	Waste Reduction: 3952 pounds HM Use Reduction: 4888 pounds Reduction in toxicity Standardization of Process and Materials
6	Paint Gun Cleaning in DOL	1996	Source Reduction: Improved Equipment & Procedures	$3,955	$726	Waste Reduction: 339 pounds HM Use Reduction: 450 pounds
7	Paint Solvent Recycling at DOL	1995	On-Site Recycling & On-Site Reuse	$7,090	$6,795	Waste Reduction: 3053 pounds HM Use Reduction: 3000 pounds
8	Risograph at DPCA Marketing	1996	Source Reduction: Improved Process	$29,813	$7,861	Waste Reduction: 1,715 pounds HM Use Reduction: 80% Reduction 50% increase in Productivity without increase in manpower
9	Aqueous Parts Washers	1995	Source Reduction: HM Substitution & Improved Processes and Procedures	$52,626	$19,500	NPDES discharge limits not exceeded Decrease in labor cleaning large parts Reduction in toxicity of cleaners
10	TASC Digital Photography	1997	Source Reduction: Hazardous Material and Waste Elimination through Improved Equipment & Procedures	$156,700	$1,255,200	Reduction of photographic chemicals collectively valued at $45,000; Reduction of silver-containing waste Reduction in Troop Labor
11	PCS Soil Cleanup & reuse	1997	On-Site Treatment & On-Site Reuse	$49,427	$230,920	500 Cubic yards of soil treated and reused as fill
12	Chlorine gas substitution at Fort Lewis WTP	1996	Source Reduction & Risk reduction via Hazardous Material Substitution	$3,120	$5186	Replaces a TRI reportable chemical Reduction in Risk Improves Safety of surrounding community